

## Rappahannock Electric Cooperative

### Smart Grid Initiative

#### Abstract

Rappahannock Electric Cooperative's (REC) Smart Grid Initiative project involves deploying smart meters, distribution system infrastructure and a communications network to support the new smart grid assets. The project is focused on the portion of REC's service territory recently acquired from Allegheny Power. As part of this project, REC is deploying smart meters throughout its service territory. Full coverage allows REC to introduce and test advanced pricing programs and a pre-pay program. The project includes a meter data management system (MDMS) to assist in managing all the increased data available from the smart meters. The project also deploys distribution automation equipment including supervisory control and data acquisition (SCADA) and automated controls on distribution voltage regulators to improve power quality, reduce line losses, and reduce operations and maintenance costs through monitoring and control of distribution voltage.

#### Smart Grid Features

**Communications infrastructure** includes new digital microwave backhaul links and a point-to-multi-point data radio network delivering distribution SCADA and meter data from substation collectors to REC headquarters. A power line communications based network using two-way automatic communication systems technology connects substation data collectors to meters and demand response devices.

**Advanced metering infrastructure (AMI)** includes the deployment of 52,600 smart meters across REC's service territory which completes coverage for all of REC's customers. One hundred percent smart meter coverage, including those in REC's newly acquired territory, allows REC to offer time-based rate programs in the future and monitor electricity demand more accurately. REC is installing meters with functionalities including outage detection, power quality monitoring, tamper detection, and remote connect and disconnect. The MDMS processes meter data and improves operational efficiency, customer service, energy forecasting, distribution system reliability, and regulatory compliance. These benefits result from reductions in manual processes, improvements in meter data quality, increases in data storage capabilities, and more accurate calculations of unbilled revenue. REC is also installing 10,500 remote connect and disconnect devices across its system.

#### At-A-Glance

**Recipient:** Rappahannock Electric Cooperative

**State:** Virginia

**NERC Region:** SERC Reliability Corporation

**Total Budget:** \$31,388,194

**Federal Share:** \$15,694,097

**Project Type:** Advanced Metering Infrastructure and  
Customer Systems Electric Distribution  
Systems

#### Equipment

- 52,600 Smart Meters
- AMI Communication Systems
  - Meter Communications Network
  - Backhaul Communications
- Meter Data Management System
- 12,500 Direct Load Control Devices
- Distribution Automation Equipment for 66 out of 283 Circuits
  - Distribution Automation Communications Network
  - SCADA Communications Network
  - Automated Voltage Regulators
  - Equipment Condition Monitors

#### Key Targeted Benefits

- Reduced Electricity Costs for Customers
- Reduced Operating and Maintenance Costs
- Increased Electric Service Reliability and Power Quality
- Reduced Costs from Equipment Failures, Line Losses, and Theft
- Reduce Truck Fleet Fuel Usage
- Reduced Greenhouse Gas Emissions

**Rappahannock Electric Cooperative** (continued)

**Direct load control devices** are being deployed to customers that volunteer for the demand-side management program. The devices control water heaters and air-conditioners and enable REC to lower peak demand when needed to reduce the need for REC to purchase power at the most expensive times. This reduces both customer electricity bills and REC's operating expenses.

**Distribution automation systems** include advanced automated equipment to improve the performance of its distribution equipment. REC is deploying automated distribution voltage regulator controls and substation SCADA. The SCADA installation completes the coverage of REC's substations, allowing the utility to monitor its entire distribution system. This SCADA installation allows REC to better respond to changes in load and system conditions, increasing system reliability while reducing operation costs and outages. REC is also replacing 1,081 down line single phase hydraulic reclosers with a mixture of three-phase and single-phase electronic controlled vacuum reclosers. These new reclosers provide the platform for future system monitoring and control.

**Distribution system energy efficiency improvements** involve the integration of automated voltage regulator controls with power quality monitoring and reverse power capability. The network of regulators improves voltage and volt ampere reactive control, improve power quality, and increase distribution capacity by reducing energy losses on the distribution system.

**Timeline**

Key Milestones	Target Dates
AMI and distribution automation asset deployment begins	Q2 2010
AMI and distribution automation asset deployment ends	Q1 2013

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